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TITLE OF THE INVENTION

GEARED SEGMENTS WITH VARIABLE GEAR RATIO

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GEARED SEGMENTS WITH VARIABLE GEAR RATIO

Field of The Invention

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This application claims the benefit of Slovak Republic (Slovakia) Application No. PÚV 21-2003, filed February 5, 2003. The technical solution herein disclosed relates to geared segments with variable transfer ratio determined mainly in 10 mechanical machines, motors and pumps, where provision of a variable transfer ratio during one revolution is desirable.

Background of the Invention

Until now there are known mechanical, electrical, pneumatic, 15 hydraulic, magnetic and combined gears that transfer the motion and mechanical power from one shaft to another shaft while one pair of geared wheels (cog wheels) performs a movement that has a constant transfer ratio given by the ration of the number of teeth of wheels. The disadvantage of these given technical 20 solutions is that there is a constant transfer ratio where provided by the meshing one or two pairs of teeth of co-engaged wheels and optimum efficiency is not provided.

Another known solution is a transfer facility according to invention's description to applicant's certificate no. 223 064 is 25 formed by a box of facility, equipped with a geared crown wheel co-engaged (meshed in) with a gearing freely placed pinion, firmly connected with the outlet shaft. Though it is possible to

achieve with the given transfer facility high gear ratios of revolutions by one pair of geared wheels (cog wheels), the disadvantage of the above solution is the fact that the driving and driven shaft are in one axis, the transfer ratio is constant and thus does not provide optimum efficiency of the facility.

5 Another known solution is the transfer equipment with a changeable gear ratio according to the patent documentation no. 10 281 220 that mainly relates to motor vehicles that contain a between the input and output, a differential mechanism that has three inputs. The disadvantage of the given solution is the high price, heavy weight, low efficiency and great complexity, especially if it contains a greater number of geared wheels with various transfer (gear) ratios as required by current industrial 15 trends.

Though the latest gear ratios contain a mechanism for direct meshing that start to work when the motor vehicle reaches a certain average driving speed, to remove at this stage the losses in the exchanger (transmission or converter), the above given 20 mechanisms that are very complex, do not solve the issue connected with high power losses caused by the converter at low speeds.

From U.S. Patent No. 3,426,618 is further also known an equipment whose input drives communicate directly through the

torque converter and reduction gear with the second input of gear mechanism. This results in the fact that there goes through a the converter only a certain part of power and thus the losses in the converter can be decreased. The disadvantage of this
5 technical solution is a relatively complex and large gear mechanism.

The object of the technical solution of the device herein disclosed, is to create a gear mechanism with a variable gear ratio of given type, in a simple manner having minimal parts.

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Summary of the Invention

The given shortages are in a great extent eliminated by geared segments with variable transfer (gear) ratio aimed mainly for use
15 in mechanical machines, motors and pumps where there is a constant requirement for a variable transfer ratio for the variability and optimization of the load of torque that are formed by a driving shaft and driven shaft. This is based on the fact that there is placed on the driving shaft in the axis of rotation a collapsible driving eccentric geared segment with a
20 driving gear mechanism that is formed of at least three driving teeth from which at least one of them is meshed with minimum one driving teeth of external driving gear mechanism that is formed on the periphery of co-engaged (meshed) driven eccentric geared

mechanism while in the driven eccentric geared mechanism is in the axis of rotation placed the driven shaft.

It is an advantage that the number of the teeth (cogs) of driving eccentric geared segment is identical with the number of 5 teeth of driven eccentric geared segment.

Further, it is also advantageous, that the axis of rotation of the driven shaft is moved outside of the center axis of driving eccentric geared segment and the axis of rotation of the driven shaft is moved outside of the center axis of the driven eccentric 10 geared segment.

Further objects of the invention will be brought out in the following part of the specification, wherein detailed description is for the purpose of fully disclosing the invention without placing limitations thereon.

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Brief Description of the Drawings

The technical solution in this disclosure will be more closely explained with the help of drawings where

Fig. no. 1 are schematically depicted geared segments with 20 variable transfer (gear) ratio

Fig. no. 2 is a spatial depiction of geared segments with variable transfer (drive) ratio

Fig. no. 3 is schematically depicted the illustration of the mesh of geared segments with parameters.

DETAILED DESCRIPTION OF THE PREFERRED

EMBODIMENTS OF THE INVENTION

Referring now to the drawings, Figures 1-3 depict the disclosed device, the disclosed device as depicted in fig. no. 1 is made from a driving shaft 11 where is placed a collapsible driving eccentric geared segment 1, that is placed in the axis of rotation. The axis of rotation of the driving shaft 11 is located outside of the center axis of the driving eccentric geared segment 1. On the periphery of driving eccentric geared segment 1 is created an external driving gearing 12 that is formed of driving teeth 121 that have various shapes and sizes. The driving teeth 121 of the external driving gearing 12 are meshed with the driven teeth 221 of the external driven gearing 22, while there is a constant axial distance between the axis of rotation of the driving shaft 11 and axis of rotation of driven shaft 21. The module m of driven teeth 221. The spacing (distance) t of driving teeth 121 is identical with the spacing t of driven teeth. The external driven gearing 22 is formed on the periphery of co-engaged (meshed) driven eccentric geared segment 2. In the axis of rotation of driven eccentric geared segment of figure 2 is placed the driven shaft 21.

The disclosed device according to fig. no. 3 is formed of a driving eccentric geared segment 1 that is located in the axis of rotation C_1 . The axis of rotation C_1 is placed outside of the

center of driven eccentric geared segment 1. On the periphery of driving eccentric geared segment 1 is formed of a driving gearing 121 that is formed of driving teeth 121 whose number is z_1 . The module of driving teeth (cogs) 121 has a value of m_1 .

5 The driven eccentric geared segment 2 is placed in the axis of rotation C_2 . The axis of rotation C_2 is placed outside of the center of driven eccentric geared segment 2. On the periphery of co-engaged driven eccentric geared segment 2 is formed a driven gearing 22 that is formed of driven teeth (cogs) 221 whose number 10 is z_2 . The module of driven cogs 221 has a value of m_2 . The cogs 212 of driving gearing 12 are meshed with driven cogs 221 of the driven gearing 22 while the constant axial distance between the axis of rotation C_1 and axis of rotation C_2 is a . The module of driving cogs 121 m_1 is identical with the module of driven cogs 15 (teeth) 221 that has a value m_2 . The spacing of driving teeth 121 has a value of t_1 is identical with the spacing t_2 of driven teeth 221 whose number is z_2 and is the same as z_1 . The center axis A_1 of the driving eccentric geared segment 1 is parallel to the center axis A_2 of the driven eccentric geared segment 2. The 20 spacing of center axis A_1 and the axis of rotation C_1 is the eccentricity e_1 that is identical with the eccentricity e_2 that is the spacing of center axis A_2 and axis of rotation C_2 . The spacing radius r_1 of the driving eccentric geared segment 1 is changed based on the angle of turning (rotation) α and the

spacing radius r_2 of the driven eccentric geared segment 2 is changed based on the angle of turning (rotation).

For the given parameters are valid the following dependences:

5 The minimum spacing radius $r = a - a/2 - e$,

while the eccentricity $e = \cos \alpha/2 \cdot a/2$

and at the same time it has to be preserved that $n + r_2 = a$

As an example of industrial applicability, in addition to
10 transmissions and differentials and by no means is intended to limit the disclosed device herein, the disclosed device can be utilized on the cog wheel fixed to the bicycle pedal that adjusts to a torque of best efficiency at the most efficient utilization of cyclist's torque. Another option for the utilization of
15 technical solution is the use in combustion engines where it may be used to replace the crankshaft by an eccentric geared segment while there are meshed always the same cogs.

While all of the fundamental characteristics and features of
20 the present invention have been described herein, with reference to particular embodiments thereof, a latitude of modification, various changes and substitutions are intended in the foregoing disclosure and it will be apparent that in some instance, some features of the invention will be employed without a

corresponding use of other features without departing from the scope of the invention as set forth. It should be understood that such substitutions, modifications, and variations may be made by those skilled in the art without departing from the spirit or scope of the invention. Consequently, all such substitutions, modifications and variations are intended to be included within the scope of the invention herein disclosed and described.

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What is claimed is: